Mobile Networks and Applications (MONET) Special Issue on Sensor Systems and Software

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Wireless sensor networks introduce innovative and interesting application scenarios that may support a variety of different application domains including environmental monitoring, disaster prevention, building automation, object tracking, nuclear reactor control, fire detection, agriculture, healthcare, and traffic monitoring. The widespread acceptance of these new services can be improved by the definition of frameworks and architectures that have the potential to radically simplify software development for wireless sensor network based applications. The aim of these new architectures is to support flexible, scalable programming of applications based on adaptive middleware.

As a consequence, wireless sensor networks require novel programming paradigms and technologies. Moreover the design of new complex systems, characterized by the interaction of different and heterogeneous resources, will allow the development of innovative applications that meet high performance goals. As a consequence, wireless sensor networks require contributions from many fields such as embedded systems, distributed systems, data management, system security and applications.

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This Special Issue on Sensor Systems and Software provides a venue to report on recent developments in addressing the research challenges facing system development and software support for wireless sensor networks based systems. In particular, it places emphasis on layers well above the traditional MAC and routing, and transport layer protocols.

In the paper Robust Image Transmission over Wireless Sensor Networks, Boluk, Baydere and Harmanci consider the problem of ubiquitous multimedia applications over wireless sensor networks. In particular, they attempt to address the problem of distortions caused on the image data due to channel and instant node failures. They propose two techniques, which they relate to multipath transmission, as a means to compensate for the occurrence of the above problems at the expense of increasing energy consumption and bandwidth requirements. The first technique is based on watermarking and aims to conceal errors by utilizing the discrete wavelet transform to embedding minute replicas of the original image into itself. The second technique is a modification of Reed-Solomon coding appropriate for this context. Through extensive simulations, they discover that error concealment with multipath fusion provides superior performance.

Chen, Gonzalez, Vasilakos, Cao and Leung provide a survey in the very active area of Body Area Networks (BANs). Such networks are widely recognised as a core ingredient of next generation healthcare monitoring applications. The survey specifically considers BAN communication modes and their costs and benefits and identify the main design challenges and open issues that need to be addressed before BANs become competitive in applications.

Finally, Zoumboulakis and Roussos consider the problem of Complex Event Detection in Extremely Resource-

Constrained Wireless Sensor Networks. Such events are common in many WSN applications, and in this paper the authors develop a family of detection algorithms based on online symbolic conversion of sensor readings. These algorithms have fixed execution cost and modest resource requirements and can cater for a variety of application scenarios including exact, approximate, non-parametric, multiple and probabilistic detection. The authors discover that these algorithms are particularly well suited for the low end of the WSN spectrum and also required limited configuration, promote unattended operation and complement the goal of prolonged lifetime.